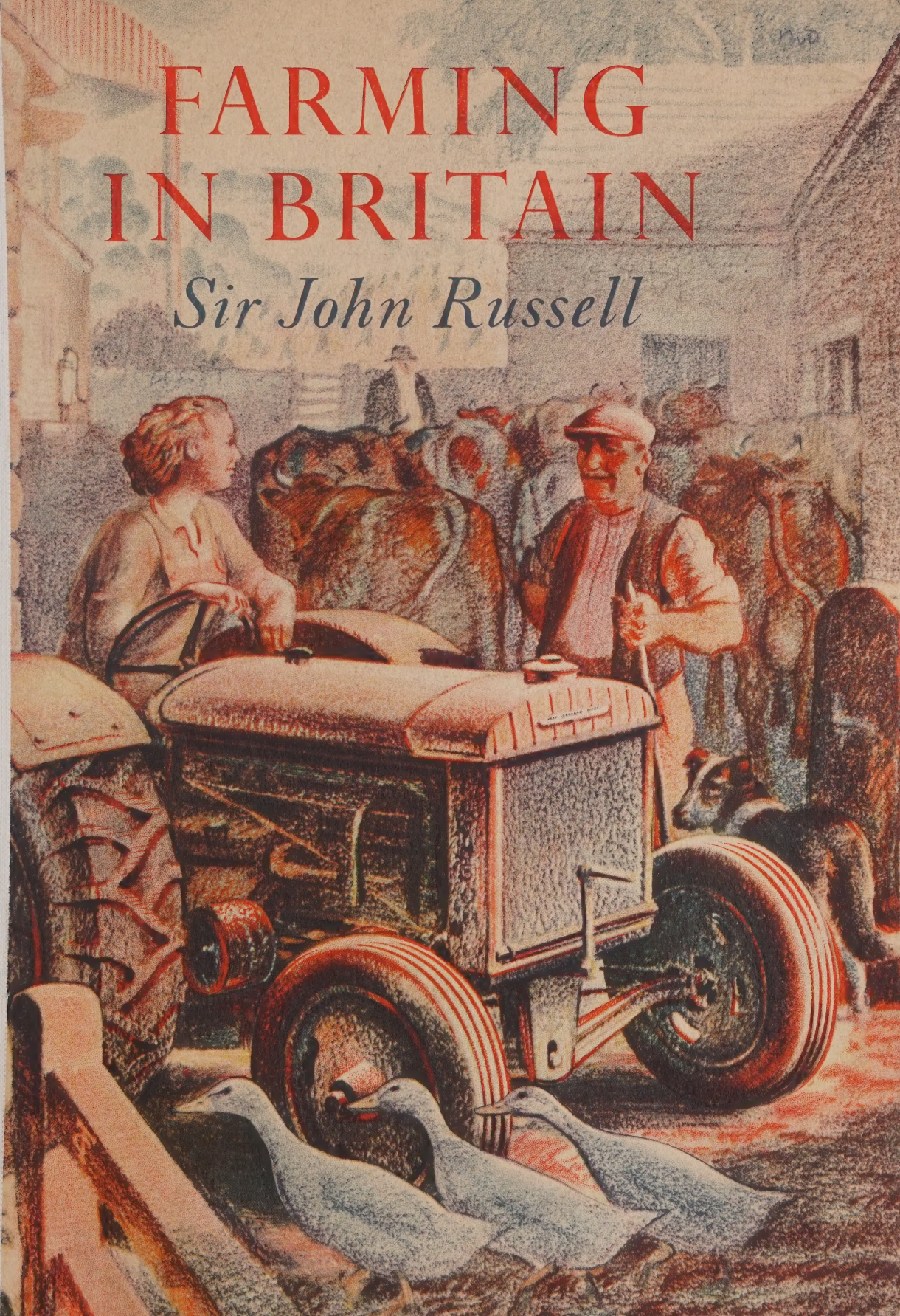
# FARMING IN BRITAIN

*Sir John Russell*



# British Feeds

TRIFOLIUM REPENS L. VER.

TRIFOLIUM PRATENSE L.

LOLIUM PERENNE L.

FESTUCA OVINA L.

DACTYLIS GLOMERATA L.

LOLIUM ITALICUM. BRAUN.

POA PRATENSIS L.

FESTUCA ELATIOR L.

MEDICAGO SATIVA L.

BRASSICA ALBA BOISS.

MEDICAGO LUPULINA L.

TRIFOLIUM REPENS L.

ALOPECURUS PRATENSIS L.

ONOBRYCHIS SATIVA LAMK.

BRASSICA NAPUS L.

VICIA SATIVA L.

TRIFOLIUM HYBRIDUM L.

TRIFOLIUM INCARNATUM L.

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# FARMING IN BRITAIN

*Sir E. John Russell*

Edward
III

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We are indebted to the *Farmer and Stockbreeder* and G. S. McCann for all photographs of cattle, sheep and pigs in this book.

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THE AGRICULTURAL REGIONS OF BRITAIN
FEN COUNTRY.
Potatoes, Sugar Beet, Wheat, Oats.
KENT, SURREY, SUSSEX AND HAMPSHIRE.
Fruit, Hops, Vegetables, Wheat, Sheep, Cattle.
THE VALE OF EVESHAM
Fruit, Vegetables.
THE WEST COUNTRY.
Cattle, Dairy Produce, Wheat, Oats.
THE NORTH OF ENGLAND.
Cattle, Sheep, Pigs.
LINCOLNSHIRE.
Potatoes, Vegetables, Wheat, Oats, Sugar Beet, Cattle, Sheep
EAST ANGLIA
Wheat, Vegetables, Sheep, Sugar Beet, Barley, Pigs.
SCOTLAND.
Cattle, Sheep, Oats, Potatoes, Roots.
WALES AND BORDER COUNTIES.
Cattle, Sheep.
MIDLANDS.
Cereals, Potatoes, Cattle, Dairy Produce, Sheep.
BEDFORDSHIRE, BUCKINGHAMSHIRE HERTFORDSHIRE, AND BERKSHIRE.
Cereals, Potatoes, Cattle, Dairy Produce, Sheep, Market Gardening (especially Tomatoes).

*Harvest in the south of England. Stooked barley standing in the fields.*

# I

# FARMING IN BRITAIN

Farming in Britain differs from farming in most other parts of the world; this is due to the special conditions of the British climate. The summers are cool and the winters mild over most parts of the country. Over eastern England the rainfall varies from about 22 to about 28 inches per annum, but in the west it is much higher, and in the hill districts it rises to 70 inches or more. The rain is distributed all over the year; there is no "dry season" or "wet season". Owing to economic conditions it is necessary for the farm workers to achieve a great deal during the day, and much use is made of machinery.

## Most Farms are Small

By far the greater part of the agricultural land is in holdings from 50 to 300 acres; less than 10 per cent is in holdings of 500 acres or more. The farms are divided into fields 10 to 25 acres in size, surrounded by fences or by hedges three to six feet high, or in the north and west by stone walls, but many of the trees are left to grow up, so that in looking down on the country from a hill or an aircraft one gets the impression of a well-wooded region. Each holding, no matter how small, has its own house and farm buildings.

In general, farmers do not own their farms, but rent them from a landlord; they have, however, considerable legal protection against disturbance or interference, and it often happens that a farm has been held for several generations by the same family. Since the last war ownership by farmers has become more common, but they do not like it very much because it costs more to be an owner than to be a tenant. Other things being equal there is a tendency for small farms to be higher rented than large ones because of the larger number of buildings

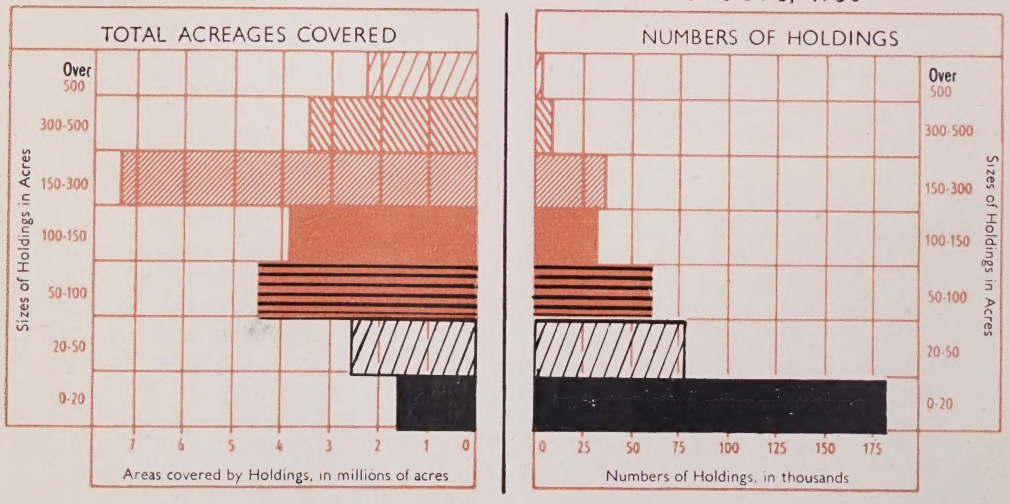
*The rich, red earth of the West Country. A Devon farmstead.*

per 100 acres ; they cost more to run, but also they produce more per acre.

The wages per 100 acres are larger on the small farms, but so are the returns per £100 spent on wages. The purchased foodstuffs for the animals are higher per 100 acres, but the receipts per £100 thus expended are not, nor are the receipts per £100 of expenses.

## DISTRIBUTION OF AGRICULTURAL LAND IN ENGLAND AND WALES

CLASSIFICATION OF HOLDINGS IN SIZE GROUPS, 1930*




* By 1938 the total number of Holdings had fallen by 29,840; these were almost entirely in the Under-50-Acres group

*Fig. 1*

This is shown in Table 1 drawn up by A. W. Ashby.

Great changes have taken place in the structure of British national life during the past 70 years, resulting in much consolidation of manufacturing and business concerns. But there has been no tendency to consolidate farm holdings. The number of farmers recorded in the Census of 1871 was nearly the same as in the Census of 1931, although

## Table 1 SIZE OF FARMS AND EFFICIENCY OF PRODUCTION IN ENGLAND AND WALES

(Summary of 1,993 Farms in 1938)

| | *Acres* | *Acres* | *Acres* | *Acres* |
|---|---|---|---|---|
| Mean Size of Farm ... ... ... ... | 107 | 174 | 240 | 415 |
| Range ... ... ... ... ... ... | 83-149 | 150-199 | 200-299 | 300 & over |
| | £ | £ | £ | £ |
| Receipts per 100 acres ... ... ... | 1,604 | 1,288 | 1,064 | 868 |
| Receipts per £100 rents ... ... ... | 968 | 934 | 891 | 904 |
| Receipts per £100 bought-feeds ... ... | 339 | 393 | 421 | 405 |
| Receipts per £100 wages ... ... ... | 554 | 469 | 479 | 408 |
| Receipts per £100 expenses ... ... ... | 111 | 108 | 102 | 107 |
| Rent for 100 acres ... ... ... ... | 166 | 138 | 119 | 96 |
| Bought-feeds per 100 acres ... ... ... | 473 | 328 | 253 | 214 |
| Wages per 100 acres ... ... ... ... | 289 | 275 | 222 | 212 |
| Expenses per 100 acres ... ... ... | 1,440 | 1,196 | 1,041 | 812 |

*A farm in Kent, the county from which the Romney Marsh sheep come.*

the numbers of working relatives and of paid workers had greatly diminished :—

| ENGLAND AND WALES | | | |
|---|---|---|---|
| | *Farmers* | *Male and Female Relatives* | *Employed persons* |
| 1871 | 249,907 | 168,653 | 996,642 |
| 1931 | 248,246 | 80,782 | 511,666 |

Although figures for sizes of farms are not available as early as 1871, there is no evidence of any important change : the records begin in 1930 (Fig. 1), and between then and 1938 there was a shrinkage in the number of small holdings, but no change in the farms above 50 acres.

The British farm worker (including the farmer) turns out considerably more food per annum than any on the Continent. The figures are striking and are given in Table II.

Most farmers have to hire workers, but the wages paid are governed by the fact that the majority of our people live in towns, so that wages in the country are determined not by the value of the produce, but by the wage rates in the town ; if the farm worker thinks his wages are too low he moves off to the town to take work there.

This necessity for paying high wages has compelled farmers to maintain a high output per man, and this has been one of the most striking features of British agriculture during the past 20 years. The number of workers on the land fell steadily for many years before the war, but the total output from the land did not fall because the output from

## Table II

VALUE OF AGRICULTURAL OUTPUT IN GREAT BRITAIN, GERMANY AND WESTERN EUROPEAN COUNTRIES, 1937

(*P. Lamartine Yates*)

| | *Output per Worker, £* | | *Wages per Hired Worker, Shillings Weekly* | *Acres per Worker* | *Live stock Units per Worker* | *Output per Acre, £* | |
|---|---|---|---|---|---|---|---|
| | *Gross* | *Net* | | | | *Gross* | *Net* |
| Great Britain | 240 | 200 | 30—36 | 33·8 | 10·3 | 7 | 6 |
| Denmark | 180 | 155 | 23—26 | 15·7 | 8·4 | 11 | 10 |
| Netherlands | 150 | 120 | 23—30 | 9·0 | 4·9 | 17 | 14 |
| Belgium | 110 | 100 | 18—22 | 7·4 | 3·4 | 15 | 14 |
| Switzerland | 110 | 100 | 27—29 | 7·1 | 4·3 | 17 | 15 |
| France | 90 | 90 | 20—28 | 11·6 | 2·8 | 8 | 8 |
| Germany | 70 | 70 | 18—23 | 7·9 | 2·8 | 8 | 8 |

*A farm on the moors in the extreme north of England.*

the surviving workers increased. In consequence, agricultural wages rose steadily, and before the war were higher than at any previous time except during the war of 1914-18. During the war this rise became even more pronounced and as will be seen in Fig. 2 a wage of £3 per week has now been reached, a sure sign of a healthy and progressive industry.

Public opinion in Great Britain has always opposed import duties on staple foods, and in consequence farmers have always had to keep to crops well suited to the local conditions. Probably in no other country is there a closer adaptation of agriculture to local conditions than here.

## The Agricultural Regions of England and Wales

Great Britain has had a long and chequered geological history and although its area is small all the chief geological formations are represented here : the result is a very great variety of soils and extensive regions of high hill country and of level or undulating lowland plains, giving rise to considerable

AGRICULTURAL OUTPUT, WAGES AND NUMBERS OF WORKERS

ENGLAND AND WALES 1925-1939

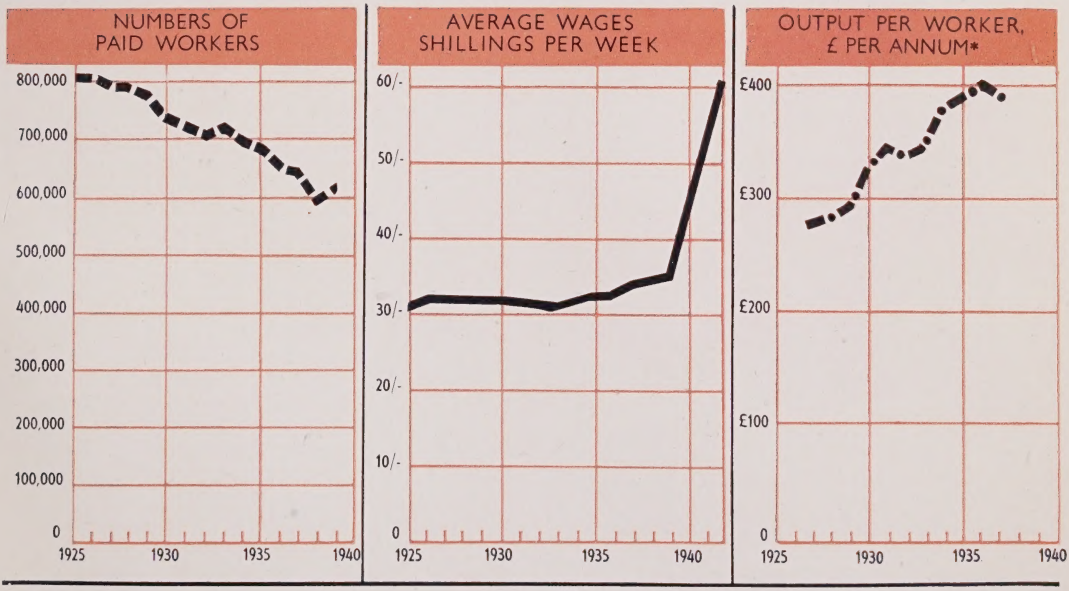



*Fig. 2*

*At 1927 prices

variety of climate which, however, remains always of the insular type.

The oldest rocks, the Palæozoic, crop out in the west and north ; in ages long past they formed great mountains and some were active volcanoes : now they are worn down to mere stumps and the highest in Wales is only 3,639 feet above sea level. This western and northern country is the hill region of Britain ; it catches the Atlantic winds heavily laden with moisture, so it is also the wet region.

The Midlands, the south and the east regions are much lower-lying, and are in the main undulating plains, rising upwards from the east where the land shelves down into the sea, to the west, forming as it goes two impressive escarpments, the first being the end of the chalk and the second the end of the Oolite ; neither of these much exceeds 800 feet above sea level and the general height is much less. The older formations are in the west and the newer ones to the

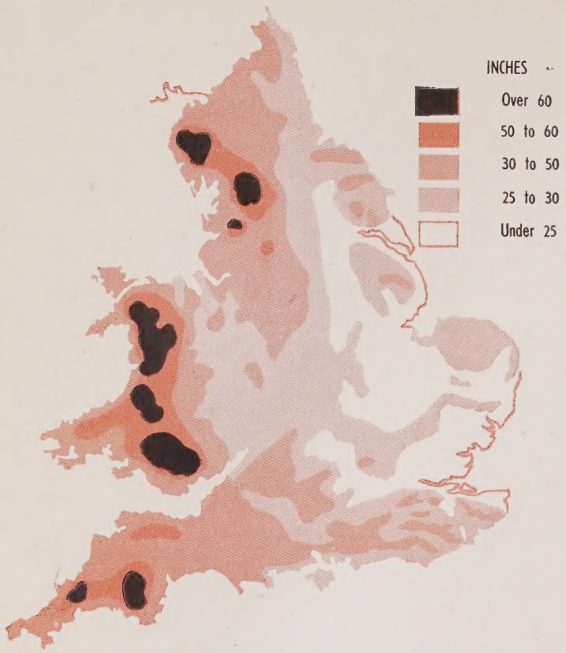
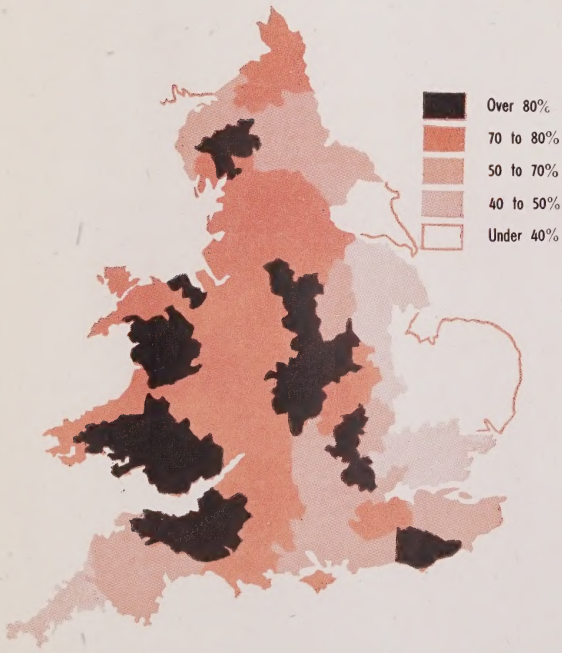



Diagram of Rainfall in England and Wales.

*Fig. 3*




Percentage of cultivated land in grass, 1938. Figures from *Agricultural Statistics*, Vol. LXXIII, Pt. I, 1938, Acreage and Livestock Returns.

*Fig. 4*

## Table III

AVERAGE ANNUAL VALUE of the Agricultural and Horticultural produce from the Farms of England and Wales in million £ sterling for THE FIVE YEARS BEFORE THE WAR (1934-1939)

| VALUE (*) OF LIVE STOCK AND LIVESTOCK PRODUCTS | *Average annual value England and Wales, Million £ sterling* |
|---|---|
| Meat : Cattle 27·2 ; Pigs 23·9 ; Sheep 15·4 ... ... | 66·5 |
| Milk ... ... ... | 57·3 |
| Eggs 16·3 ; Poultry 5·5 ; Wool 2·1 ... ... ... | 23·9 |
| | 147·7 |
| *Crops sold off the farm :* | |
| Potatoes 12·6 ; Sugar-beet 5·6 ; Wheat 5·5 ; Other Crops 6·0 ; Other Grain 6·1 ... ... ... ... | 35·8 |
| Fruit 7·3 ; Vegetables 16·0 | 23·3 |
| Glasshouse Produce ... | 8·6 |
| *Total* | 215·4 |

* *These figures include the quantities estimated to be consumed in the farm households, but they do not include any subsidy payments.*

*A model farm with good buildings and a well-planned layout.*

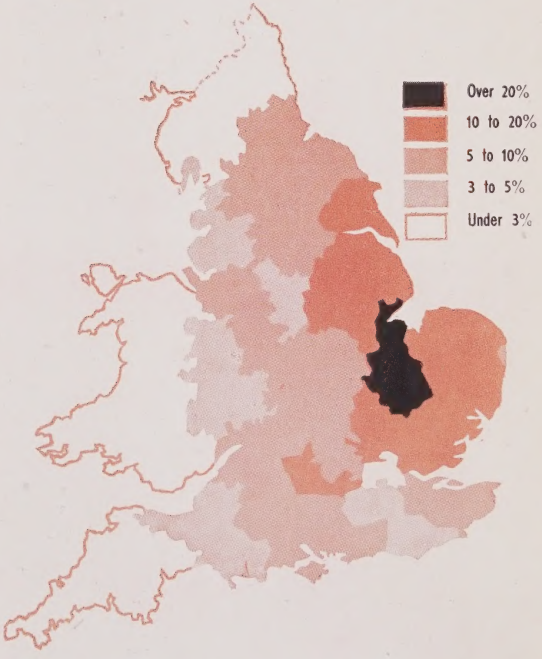
east. The rainfall decreases in passing from west to east, and the driest regions are those against the North Sea (Fig. 3).

Until comparatively recent geological times, the whole of the land north of the Thames was covered by huge glaciers which carved out the chief features of the present landscape and played a considerable part in soil formation.

The combination of high country and high rainfall in the west and the north has made grass by far the most important crop for those regions and live stock has therefore become their most important product. On the other hand arable farming predominates in the east and south, being favoured by the more level country and the lower rainfall which is unfavourable for grass.

But although the cropping of the east and south is different from that of the west and north the farmers' main product usually remains the same : live stock ; the differences lie in the way the product is secured.

This dominating position of live stock is shown in Table III setting out the values of farm produce for England and Wales. Whether arable or grass predominated, the farmer's chief aim was live stock.




Percentage of cultivated land in wheat, 1938. Figures from *Agricultural Statistics*, Vol. LXXIII, Pt. I, 1938, Acreage and Livestock Returns.

*Fig. 5*

## Table IV

AREAS OF PRINCIPAL CROPS —ENGLAND AND WALES

*Average 10 years, 1929-1938.*

| | *Thousand Acres* |
|---|---|
| Total Area (including water) ... ... ... | 37,133 |
| Total cultivated, grass and arable ... ... ... | 25,077 |
| Arable ... ... ... ... ... ... | 9,365 |
| Permanent Grass : Hay ... ... 4,671 ... | |
| Not for Hay ... 11,041 ... | 15,712 |
| Rough for Grazing ... ... ... ... ... | 5,398 |

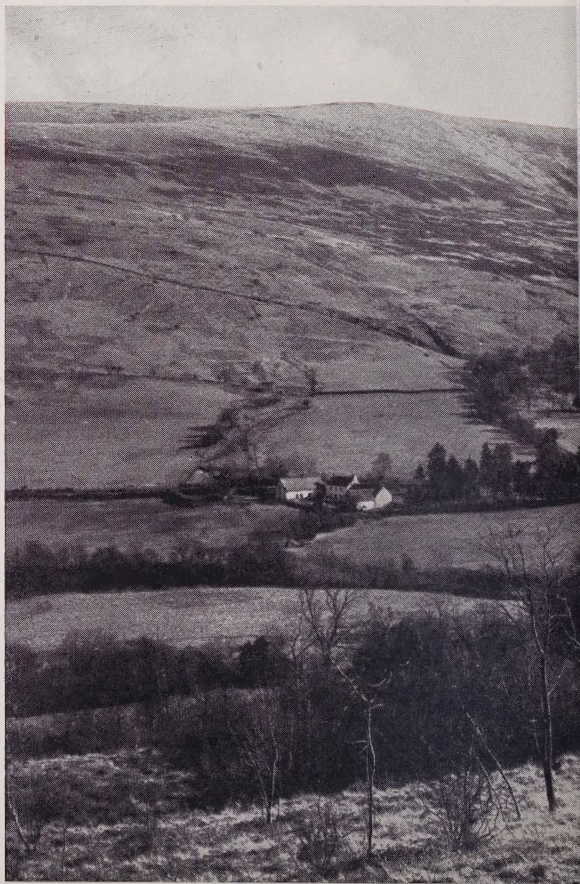
| GRAIN | *Thousand Acres* | *Average Yield per acre* | ROOTS & FODDER | *Thousand Acres* | *Average Yield per acre* |
|---|---|---|---|---|---|
| Wheat ... ... | 1,562 | 17·8 cwt. | Turnips and Swedes ... ... | 546 | 11·3 cwt. |
| Oats ... ... | 1,512 | 15·7 cwt. | Potatoes ... ... | 475 | 6·6 cwt. |
| Barley ... ... | 906 | 16·2 cwt. | Sugar Beet ... | 318 | 8·6 cwt. |
| Mixed Corn and Rye ... ... | 133 | | Mangolds ... | 249 | 18·2 cwt. |
| Beans ... ... | 150 | 16·3 cwt. | Cabbage, Kale, etc. | 139 | |
| Peas ... ... | 131 | | Vetches and Greens ... | 94 | |
| *Total* | 4,394 | | Other Crops ... | 224 | |
| | | | | 2,045 | |
| CLOVER & GRASS | | | Bare Fallow ... | 372 | |
| For Hay ... ... | 1,432 | | | 2,417 | |
| Not for Hay ... | 817 | | Orchards ... 252 | | |
| | 2,249 | | Small Fruit 59 | 311 | |
| *Average yield per acre* 26·1 cwt. | | | | 2,728 | |

## Arable Cropping of England and Wales

EASTERN REGIONS

Figure 4 shows the regions that are mainly in grass and those that are mainly in arable. The unshaded part has more than 60 per cent of its cultivated land in arable, while the heaviest shaded part has less than 20 per cent. If a line is drawn from the very top to the middle of the south coast it will be seen that in almost all the eastern part at least half of the cultivated land is arable ; the exceptions are regions of heavy clay. Taking the country as a whole, nearly half the arable land was before the war in grain, chiefly oats, wheat and barley.

The oats were used almost entirely for animals, the barley was used largely for them also, though farmers sold as much as they could for malting when it was used for making beer, whisky, or malt foods of which a good deal was consumed before the war. The wheat was used largely for bread and for



biscuits, but an increasing amount was used for poultry. A considerable part of the British grain crop, therefore, was fed to the animals.

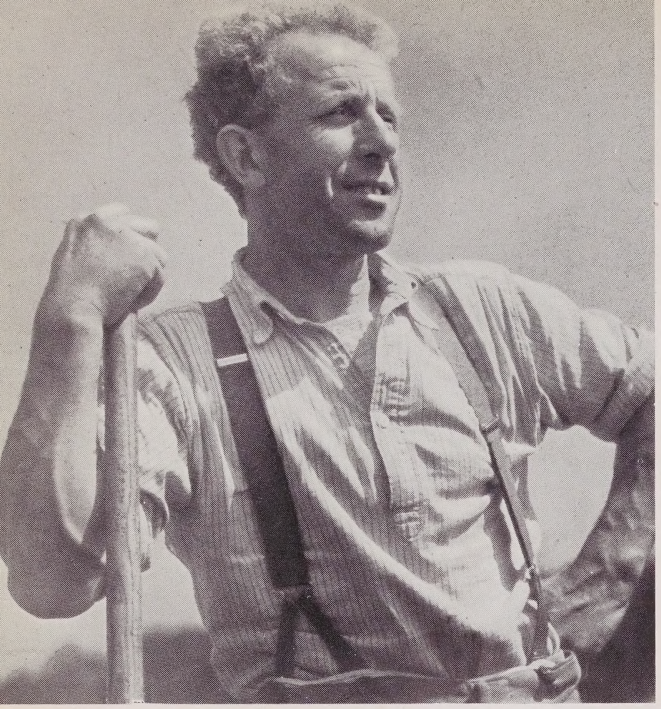
About a quarter of the arable land was in potatoes, swedes, mangolds, sugar-beets, kale, etc., often called root crops, though the name is not very good. They have the common property that they are grown in rows and can be hoed ; they allow an excellent opportunity for cleaning the land ; our good growing climate encourages weeds and the farmers are perpetually struggling against them. Further, these crops are usually the most prolific on the farm, bringing in more money per acre when they are sold, and yielding more animal food per acre when they are fed, than any others. So it pays farmers to grow them well and to give large quantities of manure, both farmyard and artificial, when necessary lime also, and any special cultivations required. Most of the produce goes to animals ; human beings have the medium and large sized potatoes, but not the small ones, the sugar from the sugar-beet, and the sprouts and cabbages. Potatoes are the most important in regard

*An assistant making tests in connection with aphis diseases at the Government Experimental Station at Rothamsted.*

*The potting house at Rothamsted in which experiments are made with many types of plants.*

*The home of the Welsh mountain sheep. A lonely farm in the Welsh hills.*

*Spraying a field of potatoes as a guard against aphis diseases and potato blight.*



*A West Country farmer pauses for a moment to look out across his fields.*

to the amount of money they return to the farmers, and in recent years also in the area they occupy. Out of 9·4 million acres of total arable land, of which about 2·4 million was in the root section of the rotation, potatoes occupied 475,000 acres ; swedes and turnips were till recently a little higher, though since 1937 they have fallen behind ; sugar-beet comes next with 318,000 acres, and mangolds 249,000 acres. From the money point of view potatoes are the most valuable arable crop in the country ; the value of the output for the five years 1934 to 1939 was £12·6 millions for England and Wales, this being more than all the grain crops sold off the farm and more than one-third the total value of all arable crops (see page 12). This high position arises from the circumstances that potatoes fit well into the programme of farm operations and they produce more than twice as much human food per acre as wheat does. All the saleable tubers are for human consumption ; none are grown for distilleries and only unsaleable tubers are fed to live stock.

Unfortunately, potatoes suffer a good deal from virus diseases which are borne by aphides and which survive in the seed tubers. Farmers therefore do not keep to their own seed but bring in new stocks certified free from virus ; these have to be grown in high or cold regions, e.g. in Scotland where the aphis does not survive and where therefore the disease cannot get a hold. Seed certified disease-free commands a high price and has made Scotch potato growing very lucrative.

The remaining quarter of the land was in grass and clover, which, however, was not left for long, but was usually ploughed up after one year.

In the old days these crops were grown in strict rotation developed from the very ancient rotation common in this country and other parts of Northern Europe :—

1st year—Winter cereals
2nd year—Spring cereals
3rd year—Fallow

This was changed at the end of the eighteenth century into :—

1st year—Winter cereals
2nd year—Root crops
3rd year—Spring cereals
4th year—Clover

which gave much more food for animals and therefore allowed a large increase in meat consumption in the country.

For many years this rotation was compulsory over large parts of eastern England, but at the end of the nineteenth century more latitude was allowed to farmers and a rigid rotation was no longer required. For some years before the war there was, therefore, a great diversity of rotations. Nevertheless there were some common sequences which still survive. A very usual one is as follows :—

In the first year root crops are grown, including potatoes, sugar-beet, mangolds, kale, swedes, etc. These are well manured and well cultivated, for heavy yields are imperative. As soon as they are removed from the ground preparations are made for a cereal crop, winter wheat or winter oats after mangolds, potatoes or sugar-beet, which are removed during October or November ; but barley or spring oats after swedes or kale, which generally remain in the ground all through the winter and are either carried to the buildings for the cattle, particularly milking cows, or they are eaten on the ground by the animals folded on to them. They are, however, finished by the end of February and the spring corn is sown as

soon after as convenient. This spring corn crop is ready for cutting in July or August. But it is not usually grown alone. In March it is undersown with red clover, or a mixture of rye grass and red clover, which starts growing but makes little progress so that it is still very small when the corn is cut ; growth is more rapid, however, after the corn is removed and until the winter. Then when the spring comes, the grass and clover burst into life and grow quickly, giving very nutritious hay in June. This is quickly removed and again the grass and clover start growing, giving a second crop which will continue to increase to the end of October. By this time, however, it is too late to make hay and so the animals are turned into this field to eat the crop as it stands, or, less commonly, it is cut and made into silage.

Then in November the land is ploughed, and whatever of the grass and clover has not been eaten by the animals goes to manure the land. It is very good manure; one of the best we know, in fact.

Winter corn is then sown ; either wheat or oats. This crop may be rather weedy, because there is little time for destruction of the weeds by cultivation; if so, the rotation starts again with a root crop, thus giving the opportunity of cleaning the land as well as manuring it.

A common variant is to take two corn crops after roots, the land being clean and in good condition.

## Manuring the Land

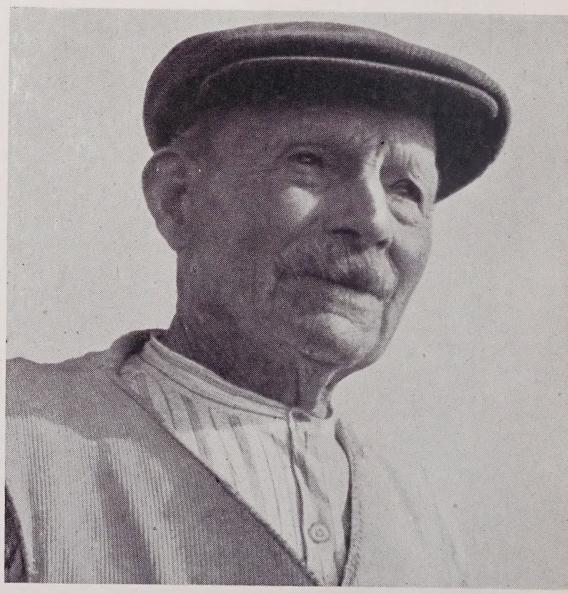
The manuring of the land in peace time was on a fairly generous scale. The basis is farmyard manure, which is made in the farmyard from the straw used as litter and the foodstuffs fed to the animals. The process of making is wasteful and about

*Harvest tea-time. A few minutes' rest and a little refreshment are all there is time for until the harvest is gathered.*

*When darkness comes the farmer's day is not over ; he must attend to his accounts and records.*

half the manurial value is lost before the material gets into the ground. The wastage still continues and, even under fairly good conditions, not more than about half the plant nutrients actually applied are taken up by the plant. Of the original plant nutrients that started to go into the manure, therefore, about three-quarters gets lost and only one-quarter finds its way into the crop. But the case is not as bad as it seems. Farmyard manure not only feeds the crop but benefits the soil and this applies to practically all soils in Great Britain. It lightens heavy soils, of which there are considerable areas, and it improves the water-holding power of light soils, of which there is much, especially in the drier regions. Farmyard manure has to be made in the farm buildings, best under cover, though in regions of low rainfall much is made in yards. The quantity made depends on the quantity of straw available and on the number of animals, and this depends on the amount of food, especially of concentrated food, grain, etc., available for them. In peace time, about 25 per cent of the concentrated food was imported, but less comes in now.

Farmers have always made as much farmyard manure as they could ; on arable



*A West Countryman who, at the age of 80, still does a hard day's work.*
*Right : A farmer from the Vale of Evesham.*

ESTIMATED AGRICULTURAL CONSUMPTION OF NITROGEN, PHOSPHORIC ACID AND POTASH IN UNITED KINGDOM AND EIRE
1913-1940

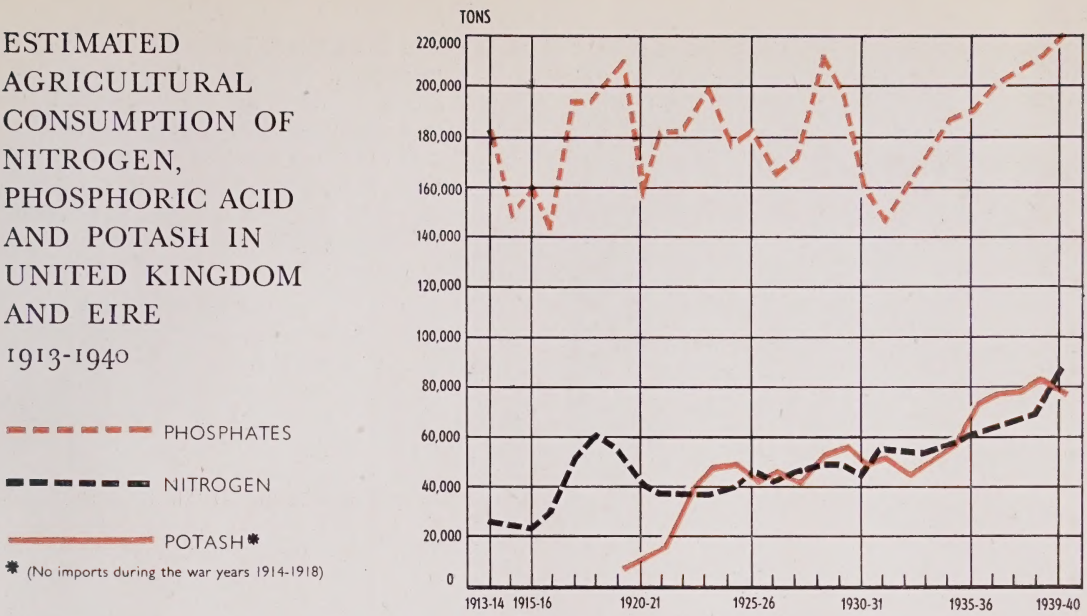



*Fig. 6*

farms there was often enough to give about one-quarter or one-fifth of the ploughed land a dressing of 10 tons per acre every four years ; it went on for the root crop. The quantity made, however, is never enough for the farmers' needs and a compost heap is usually set up to receive any waste vegetables or other organic matter, but there is not much of this.

## Artificial Fertilisers

If nothing but farmyard manure and compost were available our land would be pretty poor and the levels of yield low. Fortunately, for the past hundred years the so-called " artificial fertilisers " have been widely used ; they supply plant food in a highly concentrated and acceptable form. They supply three kinds of plant food : nitrogen, potash, and phosphate. The amounts used before the war had been steadily rising (Fig. 6) ; in the British Isles (including Eire) on the $43\frac{1}{4}$ million acres of land then under arable cultivation the amounts in thousands of metric tons were :—

| | *Nitrogen (as N)* | *Phosphoric Acid (as $P_2O_5$)* | *Potash (as $K_2O$)* |
|---|---|---|---|
| As artificial and other fertilisers ... | 90 | 210 | 90 |
| As farmyard manure (approximate only) ... ... | 130 | 55 | 180 |
| *Total* | 220 | 265 | 270 |
| Lb. per acre total | 11·2 | 13·4 | 13·4 |
| As artificials ... | 4·5 | 10·7 | 4·5 |

*The field of experimental wheat crops at Rothamsted Experimental Station, where fertiliser tests are made.*

The artificial fertilisers play two important parts in British agriculture :—

(1) They supply plant food in a very easily available form and so help the plant greatly in unfavourable seasons ;

(2) They make up the deficiency of phosphate in the farmyard manure and as each fertiliser supplies only one ingredient they can vary the composition of the plant food supplied to suit the special requirements of the crop.

They also, like farmyard manure, are given to the root crop, usually in the form of a complete dressing, i.e., a mixture supplying nitrogen, phosphoric acid and potash.

The other crops of the rotation, however, also receive artificials. The corn crop, especially the second corn crop, commonly receives a nitrogenous dressing. The grassland receives considerable dressings of fertilisers, especially of phosphates (page 27).

## Better varieties, better seed

For many years continuous efforts have been made to improve the crops by finding or breeding new varieties better suited to the natural conditions, more resistant to disease and more acceptable in the markets than the old ones. Seed testing is also widely adopted in order to ensure that all seeds sold to farmers shall satisfy proper standards of purity and germination.

*Five ploughs at work in a Sussex field get the land ready for the next sowing.*

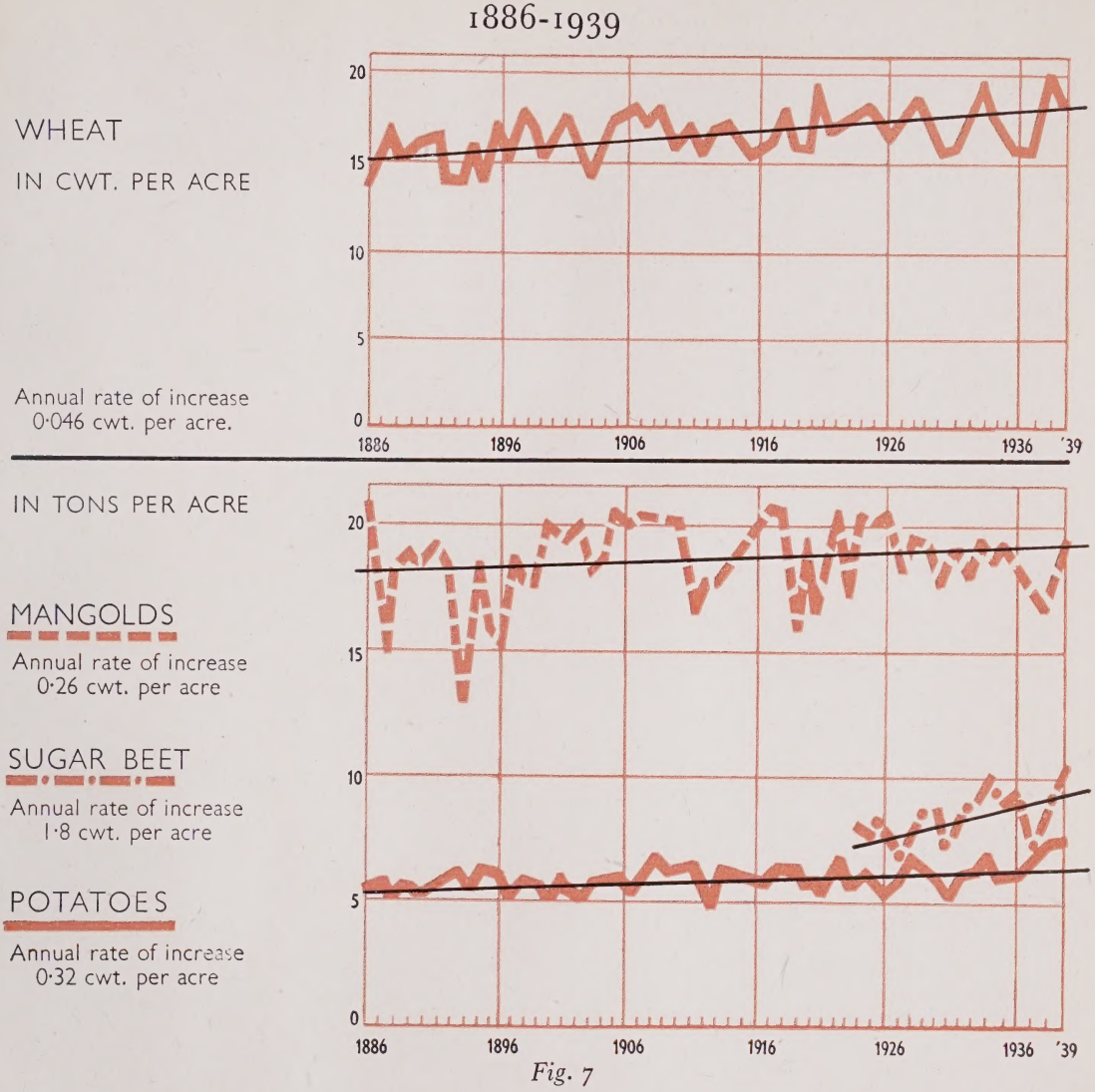



*Fig. 7*

## Steady improvement of yields

In consequence of the change of systems, in the better use of fertilisers, quicker performance of tillage operations by machinery, better varieties and better control of diseases and pests, there had been, before the war, a steady improvement in yields of the arable crops (Fig. 7).

## Some of the Agricultural Regions

Perhaps the most fertile region of Great Britain is the very flat stretch of fen country inland from The Wash; this is low lying, and it is below the level of high tide; it was formerly waste marshland badly subject to malaria and unhealthy also for animals. By one of the most remarkable reclamation schemes ever accomplished, it was embanked and drained from the seventeenth century onwards; pumping machinery was installed to keep down the water. The black soil thus left is extremely fertile. No manure, except phosphate, was given for many years, though responses are now obtained to nitrogen and on the lighter soils to potash also. The

crops are almost entirely arable ; the chief are potatoes, sugar-beet, oats and some special crops, celery and mustard, the last of which has given rise to an important mustard-making industry at Norwich. Yields are heavy, the corn is almost always " laid " and special precautions are needed in getting it in. Apart from this the agricultural problems are relatively simple ; the people like their country and do not find its flatness monotonous, nor are they perturbed because occasionally in storm tides a bank may burst and the water flow over the land, flooding it and doing much damage.

Another very fertile region lies around and just north of The Wash. It is called the Holland division of Lincolnshire. It has 250,000 acres of cultivated land, of which nearly five-sixths is arable and little more than one-sixth grass : no other part of England of equal size has so much arable land. Its most important crop is potatoes which occupy nearly one-third of the whole arable area. They are planted in early spring and lifted from July to October according to the situation : the district immediately around The Wash is so warm that the potatoes are removed early enough for cabbages to be planted, so that two crops can be produced in one year. But these favoured regions are only small ; over the greater part of the country the potatoes are lifted too late for this so they are followed by wheat or other crops. Great pains are taken to secure heavy yields. The " seed " tubers are kept in wooden boxes in glasshouses during winter so that sprouting can begin ; this assures both an earlier and bigger harvest. The manurial schemes have been carefully worked out and tested experimentally ; the varieties also are chosen to suit the requirements of the customers.

This intensive growth of potatoes naturally encourages the accumulation of soil-borne pests of the crops, especially of the eel worm. In cases of bad attack it becomes necessary to cease growing potatoes for a time and grow the crops on which the eel worm cannot feed, so that it dies out. But other methods of control are being sought.

Wheat occupies a quarter of the arable area ; the rest is occupied by a variety of crops, oats, sugar beet, clover and rotation grass being the chief.

Outside this very rich area there is much general farming less highly productive but still very good. Norfolk, the county to the south and east, is traditionally the home of good general farming, where the old four-course rotation was worked out and still in a modified form dominates the agriculture. More than 70 per cent of its cultivated land is arable, and its chief groups of crops are : (1) wheat with some oats ; (2) roots—chiefly sugar-beet, but also mangolds, potatoes and swedes ; (3) barley ; (4) clover and rotation grasses. Each of the first three groups forms about one-quarter of the total arable area as one expects in a four-course rotation, but the clover is less, showing that it is not

*Men setting sheaves in "stooks" to let the sun and air get to them.*

regularly grown once in four years. Norfolk is very dependent on farmyard manure, and its farmers worked out good systems of feeding cattle in winter so as to make it; these have undergone considerable modifications as the fodder roots (chiefly swedes) were partly replaced by sugar-beets. The sugar-beet tops are used as animal food, fed either green or as silage, and other residues from the sugar-beet factories, the brewing and milling industries and the oil seed industry are also much used. Milk production has steadily increased and a large number of pigs are kept. If one wants to see typical English general farming, Norfolk is a good county to visit.

*A combine harvester that not only cuts the crop but threshes as well.*

*The threshed corn is put into sacks ready to go to the mill.*

In the past, farmers grew no green vegetables; potatoes were the only crop apart from grain directly used as human food. Vegetable growing was the province of a special group of growers called market gardeners who were widely scattered all over the country, especially on the outskirts of large towns. Certain regions, however, were preferred because of their light soils

and good climates : the most notable included Bedford, Kent, the part of Hampshire above the Isle of Wight, the tip of Cornwall, and the Vale of Evesham. All are important, but space permits of the description of only one, and we choose the Vale of Evesham because there the transition from market gardening, pure and simple, to ordinary agriculture is well seen, a number of farmers having combined the two activities.

The Vale is that part of the Avon Valley lying between Evesham and Pershore, but with extensions south-eastwards towards Broadway and northward to Bidford. The market garden holdings are small : five to 10 acres ; these form about half the area. The farms are much larger : from 50 acres upwards ; one of the largest is 600 acres, of which 250 are used for vegetables and 350 for other crops including grass. The annual rent varies from about £1·25 per acre for the farm land to £15 per acre on the choicest and earliest market garden land ; there is, however, very little of this,

*Newly harvested corn is stacked up to await threshing.*

*Four horses pull the "digger" that digs up potatoes and leaves them ready to be gathered into baskets.*

and much of the Vale is let at £4—£5 per acre. The market garden holdings are very intensively cropped, especially with fruit; the larger holdings of farm type produce much more vegetables. A common system of cropping is to grow three crops in two years: first peas, sown from January to April and harvested from mid-June to mid-July; then the land is well worked and manured, and planted during September and October with cabbages previously raised in nursery beds; these are cut and marketed from January to May. As the land is cleared it is ploughed and top dressed with complete artificial fertiliser and in June and July it is planted with brussels sprouts previously raised in the open. Picking begins early in September and goes on to the end of February or March, after which the land is again prepared for peas.

This system of cropping can apparently continue indefinitely as long as the land is well manured, but this is rendered difficult by the circumstance that only few live stock are kept. Much organic manure has therefore to be purchased, including shoddy (i.e., waste wool mixed with cotton from the cloth factories of the north) and leather dust. Heavy dressings of nitrate of soda are also given. Diseases and pests are not troublesome; aphis does some damage to all crops and certain grubs attack the sprouts and cabbages, but they cause less loss on new than on old land.

On a holding of this sort it would be necessary to employ 10 men per 100 acres and the return per acre would be: Cabbage £30—£40, Peas £20, Sprouts £25, making about £80 in two years, i.e., £40 per acre per annum.

The planting and setting out are mostly done by machinery; indeed, fruit and vegetable production generally is well mechanised except for gathering the crops.

One other example of intensive crop production may be given; the island of Jersey. Here the climate is milder and earlier than in any part of England and in consequence crops can be produced earlier. The two chief crops are potatoes and tomatoes. Potatoes are planted in February,

*This machine ploughs out sugar-beet, tops it and lifts it in one operation, an enormous saving of time and labour.*

having previously been sprouted in boxes ; the land is heavily manured with indefinitely large amounts of sea-weed and about one ton per acre of concentrated artificial fertiliser (5 per cent N; 5-6 per cent $K_2O$; and 20 per cent $P_2O_5$). Lifting of potatoes begins early in May, while growth is still incomplete ; by this time some five to six tons per acre of saleable potatoes are obtainable and the price is so high (£20 to £30 per ton) that it pays better to lift them early than to wait for the bigger but cheaper crop that would come later. As the potato crop is lifted, tomatoes (already raised as good plants) are set out at the rate of about 14,000 plants per acre ; these produce good crops but only part is sold, a considerable number having some slight blemish, which in peace time militates against their acceptance in the market. By the end of November the picking is ended ; the land is cleared and prepared for the following year's potato crop.

As in the Vale of Evesham, the intense cropping goes on continuously, year after year, and has done so for the past 30 years or more ; no serious troubles from diseases or pests have arisen.

*Plum picking in an orchard in the Vale of Evesham, one of the big fruit-growing areas.*

*Pickers at work in a Kentish hop-field.*

# II

# THE GRASS FARMING OF ENGLAND AND WALES

GRASS IS BY FAR the most variable of all the British crops : one acre of hill grassland may give $3\frac{1}{2}$ or $4\frac{1}{2}$ lb. of meat per annum, while one acre of good lowland pasture may yield 120 lb. ; over the whole country the average is probably 70 lb. of meat or 53 gallons of milk.

Grass is also the easiest crop to grow in most parts of England and Wales. If land is left untouched it speedily covers itself with grass, clover and weeds on which animals can be turned to graze. In time of agricultural crisis, as during the 1890's and the 1920's much land " tumbles down to grass ", to use the farmer's expression.

Good grass farming, however, is a very different matter and can be made very productive. The first essential is to ensure that the right type of herbage is present : especially rye grass (*Lolium perenne*) and wild white clover (*Trifolium repens*) : these form the basis of our good pastures along with a few other grasses, chiefly cocksfoot (*Dactylis glomerata*) and to a smaller extent some of the peas and fescues. If these are present in fair quantity but kept in check by weeds or by less useful grasses it may be possible to reduce the competition by changing the conditions. Wet land must be drained ; acid land treated with lime ; poor land needs fertilisers. Much of the pasture land of England and Wales needed both lime and phosphate until recently, but great efforts have been made to supply these. On lighter lands potash also is needed. Nitrogenous manures are very effective for hay production : 1 to 2 cwt. of sulphate of ammonia or nitrate of soda per acre may add a further 4 to 6 cwt. of hay : but they are not usually given on pastures. Cultivations also have greatly improved and there are good implements for rolling and harrowing which considerably favour the growth of grass. Improvement in the conditions frequently leads not only to additional growth, but also improves the herbage : the clover and rye grass develop vigorously and crowd out their less desirable neighbours. It is often quicker and more profitable, however, to plough up the pasture and re-seed. The most convenient procedure is that known as alternate or ley husbandry which consists in leaving the grass down for a few years only, then ploughing it up, growing arable crops for a few years, then re-seeding to grass for a few years and again breaking up. This method is much used in Scotland and in New Zealand where the conditions allow of rapid establishment of a good grass herbage. It is now being advocated by Sir George Stapledon for much wider use in Great Britain.

The grass and clover leys of the arable rotations (page 16) are sharply distinct from the permanent grass, but they shade off imperceptibly into the long leys of alternate husbandry. In most arable regions the grass and clover remain only for one year, the reason being that the dry conditions usual in arable regions are unfavourable to the establishment of long leys though they permit the growth of annual clovers, especially of red clover. Frequently this alone is sown. But it is likely to fail in winter and so embarrass a farmer relying

*A flock of sheep, many of them just sheared, in the hill country of the north.*

upon it for feeding his animals, hence it is not infrequently mixed with rye grass, in the hope that this grass will succeed where the clover failed. There is, however, the disadvantage that the grass harbours some of the pests of wheat which would normally follow the rye grass and clover.

In recent years considerable improvements have been made in the varieties of clover and grass grown both for temporary and for permanent grassland ; the seed has been carefully selected from strains producing leaf rather than stem. There has been considerable specialisation in the production of grass seed : New Zealand produces excellent rye grass seed, and Denmark produces high-class cocksfoot.

In the years of crisis after the last war the grasslands of the country deteriorated and the yields of hay per acre fell, but considerable effort at improvement is now being made (Fig. 8).

## Live Stock

The numbers of animals in Great Britain is very considerable ; except for sheep they are mostly concentrated in England and Wales. For the last five years before the war they had not shown much variation ; the figures for the year 1939 are given in Table V. Per 100 acres of cultivated land there were on the average in England and Wales in 1939 no less than 27 cattle, 72 sheep, 14 pigs and three horses.

AVERAGE YIELDS OF PERMANENT HAY CROPS IN ENGLAND AND WALES FROM 1886 to 1939

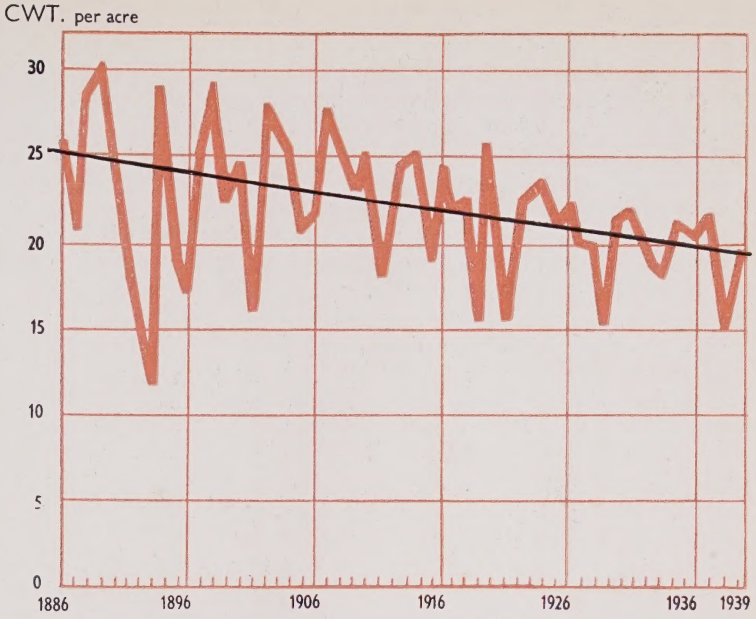



*Fig. 8*

The care of the live stock occupies the chief part of the farmers' and farm workers' time, and as shown in Table III (page 12), the financial returns from live stock are much higher than from all other farm products. The climate of Great Britain is very favourable for animals, the soil produces abundant food for them, especially grass, the farm workers understand them, like them, and are prepared to take very great trouble with them, while farmers and landowners are willing to spend much time and money in trying to improve them. Some of the best breeds in the world have originated in Great Britain, and in peace time there is a valuable export trade in pedigree animals.

## Table V

NUMBER OF ANIMALS IN ENGLAND AND WALES; GREAT BRITAIN; AND THE UNITED KINGDOM. JUNE 1939. MILLIONS.

| | *England & Wales* | *Great Britain* | *United Kingdom* |
|---|---|---|---|
| CATTLE : | | | |
| Cows and Heifers in milk or in calf ... | 3·10 | 3·61 | 3·89 |
| Other Cattle | 3·67 | 4·51 | 4·98 |
| *Total* | 6·77 | 8·12 | 8·87 |
| SHEEP : | | | |
| Breeding Ewes | 8·64 | 12·05 | 12·45 |
| Other Sheep and Lambs | 9·31 | 13·94 | 14·44 |
| *Total* | 17·95 | 25·99 | 26·89 |
| PIGS : | | | |
| Sows ... ... | 0·45 | 0·48 | 0·54 |
| Other Pigs ... | 3·06 | 3·29 | 3·85 |
| *Total* | 3·51 | 3·77 | 4·39 |
| Horses used for Agriculture ... | 0·71 | 0·84 | 0·93 |

The live stock industry has two great divisions : the breeding of pure stock, i.e., pedigree breeding, and the production of meat and milk. Pedigree breeding is an art which is only slowly being reduced to a science. It requires an exceptional combination of skill and opportunity, and money enough to last over bad periods ; it has often been a rich man's hobby. Meat and milk production on the other hand is the business of the ordinary farmer. Cross-bred animals are usually preferred especially for meat production as they generally grow more rapidly, and have greater vigour ; a pure bred sire is used and pure bred dams, though it often happens that neither sire nor dam is of sufficiently certain pedigree

to be admitted to the Herd Book, Breeding for cross-bred animals is not encouraged.

Great advances in animal nutrition have been made in recent years. The nutritive constituents needed are now known and alternative rations based on chemical analysis can easily be worked out. If the foodstuffs do not contain enough mineral matter this can be supplied in the form of salts. If a desirable foodstuff is not obtainable or only at a wastefully high price, a number of others can be considered, and the modern farmer knows how to work out a ration supplying the necessary starch equivalent and protein equivalent.

The density of the animal population in England and Wales and the importance of the live stock produce to farmers have necessitated close attention to animal health. A strong veterinary department has been established and strict laws are enforced in regard to animal health and disease.

*A dairymaid cleans the teat-cups of an automatic milking machine ; on the right you see the cups about to be placed in position.*

## Cattle

Cattle are not used for work in Great Britain and in consequence there is no attempt to produce dual purpose work and milk animals, as happens in some of the Continental countries. Many efforts have been made to produce dual-purpose meat and milk animals, but on the whole ordinary farmers find it best to keep single-purpose animals : to have pure breeds of good milking cattle and also pure breeds of good beef cattle ; the foundation stock comes from the pedigree breeders. Ordinary farmers commonly do not raise all their own milking animals but keep up their herds by buying heifers of good milking strain. While in a pedigree herd the bull is of good milking strain, on a dairy farm he is not infrequently of a good beef strain, and the young calves are sold and grow rapidly into good beef.

Milk production is financially more important than beef production, the value of output of milk being more than double that of beef. It is widely practised all over England and Wales, but especially in the west country ; in Cheshire, Somerset, Devon, Wiltshire, Shropshire, Lancashire and West Yorkshire. These counties have large areas of grass, but milk production is not confined to grass lands. Transport has become very rapid and effective. Farmers put their milk into churns which they deposit at milk-collecting stations on the road. Light lorries take them to the centre. Here the milk is cooled and examined : it is transferred to large lorry tankers holding five to 15 tons and sent off to the towns and cities. Milk production, like other forms of agricultural activity, is done mainly by small men, though

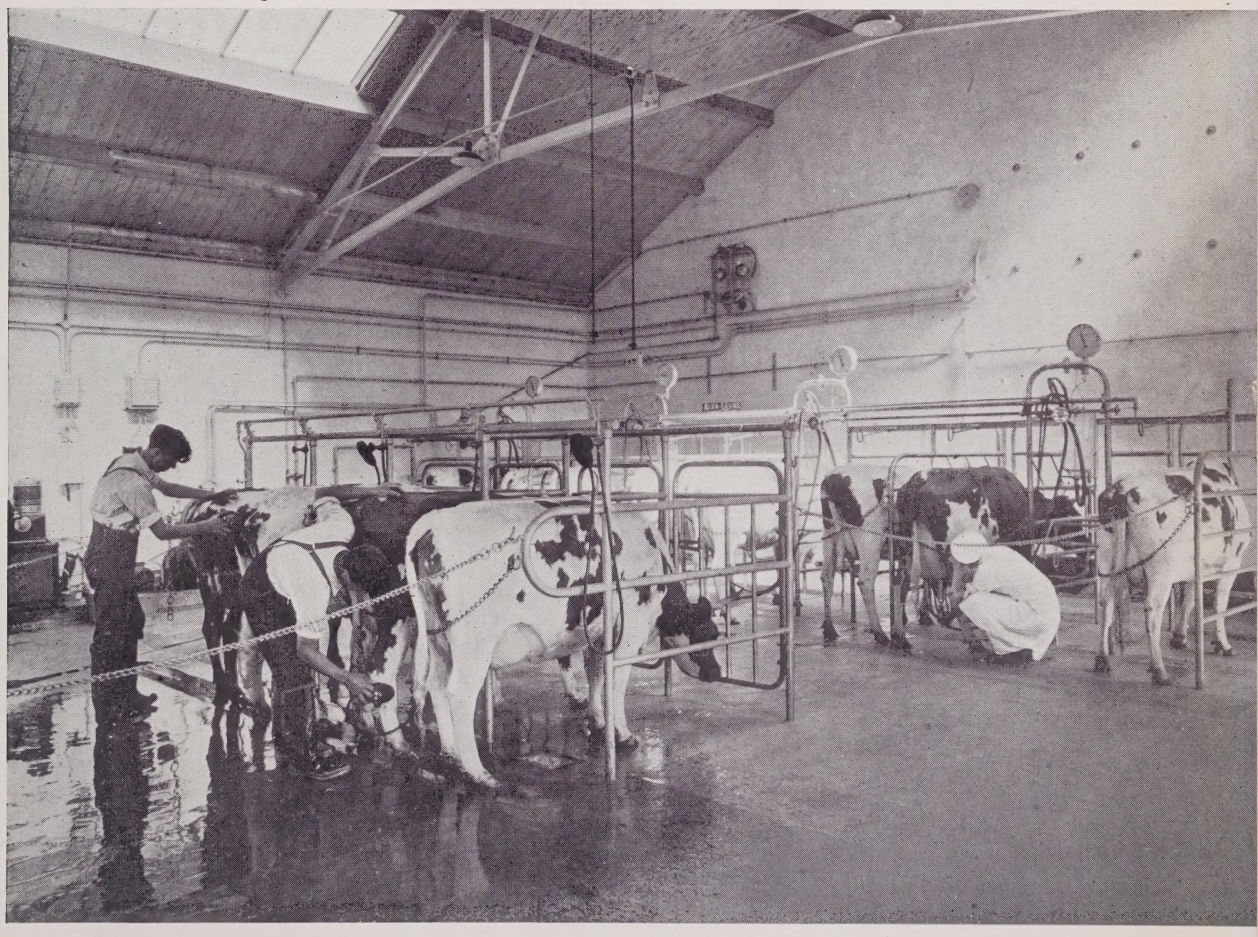
*Loading churns of milk on to a lorry at a wayside collecting point.*

there are some admirable large farms, but the distribution is in the hands of large organisations. The milk is produced on contracts, the price being agreed by the Government authority, so that farmers know how much they may expect to receive.

Great efforts are made to produce clean milk : close attention is given to sterilisation of utensils and cleanliness of workers : bacterial counts are regularly made : milking by machinery is widely adopted.

The most popular dairy cow is the Shorthorn, a red, white and roan breed that originated in Durham in the latter part of the eighteenth century : it started as a beef breed but a milking strain was soon developed and has since attained great importance. Pedigree animals must satisfy the requirements of the Breed Society before

*Cleanliness is essential in milk production. Cows are being washed and groomed before being milked by machinery.*



THE DURHAM OX

*forerunner of the Shorthorn breed of the present day.*

animals can be registered in the Herd Book. The Shorthorn Society requires four crosses of registered blood for females and five for males.

The power to yield milk comes mainly from the sire, so that careful record is kept of the milk yielded by all the registered bull's daughters. Milk Recording Societies play an important part in British agriculture.

Other popular breeds include the Ayrshire, a Scottish breed, white and black, or white and brown, and the Friesians, of Dutch origin, both very hardy and good milk producers. For poor, light, dry land, the Red Poll are better. The Channel Island breeds (Jerseys and Guernseys) are highly esteemed because of the richness of their milk. Very great efforts have been made to keep the race pure, and no cattle of any sort are allowed to enter the Channel Islands : even a Jersey bull once it has left can never go back.

Yields of milk depend on breed, strain, feeding and management : they can be pushed up high, even to 3,000 gallons per animal, but for purpose of an ordinary commercial herd it is found most economical to produce about 550 to 650 gallons. Methods of estimating yields vary and figures cannot be accepted unless it is known exactly how they were taken.

Grass forms the basis of the ration ; it is fed as hay or silage in winter along with other green crops, cabbage, kale, etc., and roots, especially mangolds, together with cake or corn in quantities depending on the milk yield.

Beef is produced in two ways. The special beef herds are the beef Shorthorns, the Aberdeen Angus, Herefords and Devons : these are very popular in good lowland conditions in the west and north, where much of our home-grown beef is obtained : for cold, rough mountain conditions, the

*Typical Dairy breed*

SHORTHORN COW

*Heavy Milk yielder*

BRITISH FRIESIAN

HEREFORD BULL

*Fine Beef strain*

RED POLL

*General Purpose breed*

Galloway, Highland and Welsh are better. But a good deal comes from the cross-bred animals of the dairy herds. Frequently the milk producer does not keep the calves but sells to a beef producer. As for milk production, the basis of the ration is grass. In peace time we produced about half the beef we consumed, and farmers aimed at doing this in summer, when grass was plentiful and beef production cheap. But in the arable regions there was much winter production of beef in the yards and buildings using roots, hay, cake and corn as food : this was expensive but it furnished the farmyard manure essential for the production of other crops.

*An old print of the May Sheep Fair, at Boston, Lincolnshire.*

## Sheep

Sheep are by far the most numerous of all farm animals in the United Kingdom but their relative importance varies in different regions. In England and Wales there are rather less than three times as many sheep as cattle, while in Scotland they are six times as numerous. Roughly speaking an English farmer would regard six or eight sheep as the equivalent of one cow for grazing purposes, so that on this basis the importance of sheep in English agriculture is about half that of cattle. The value of the meat produced agrees roughly with this (Table III, page 12). But the meat produced by cattle in England and Wales represents only about a third of their total financial output, the milk being sold for twice as much, while the meat produced by sheep is almost all the farmer gets, the value of the wool being only about 12 per cent of the total return. There is no milking of sheep in England and Wales.

Sheep husbandry has changed very considerably in the last fifty years in accordance with social changes in the towns and economic changes in the countryside. Three

BORDER LEICESTER RAM

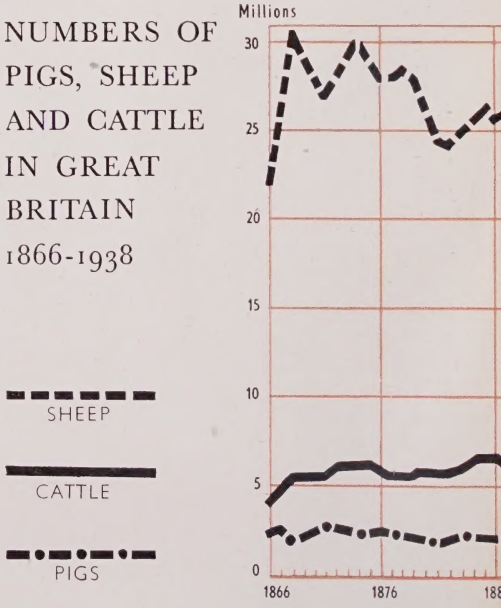
generations ago families were large, and required big joints of fat mutton especially in winter, but smaller joints of high quality were also wanted. Farmers therefore kept large breeds of sheep, as well as the smaller ones, and they evolved an excellent system of husbandry which involved penning the sheep on arable crops, particularly swedes during the winter time, and giving them additional cake or corn so that they became fat. Naturally it was only on the light lands that this was possible, as the heavy land lay too wet, but the system suited the light land admirably; the excretions from the sheep manured the land, and their treading consolidated it so that large crops of corn could be grown after the sheep were removed. The sandy and light chalk soils of eastern and northern England carried large flocks of sheep throughout the winter; more, indeed, than the local farms could supply, so there arose an important sheep breeding industry in the hills of the west and north country, and in autumn there were great migrations of sheep from these regions to the east and south.

The parents on both sides are commercially pure herds (with one exception described later) but the majority of the animals sold for meat are cross-bred because they fatten more quickly. The breeding flocks are therefore kept distinct from the meat flocks; they will of course finally be sold as meat, but in the meantime they are used for breeding as long as they are serviceable, i.e., for five or six years, during which time a ewe may produce from five to ten lambs or even more according to her breed and prolificacy.

There are many breeds of sheep in England and Wales, and in consequence it is usually possible to find two that will satisfy reasonable requirements. Of the larger sheep the Kent or Romney Marsh proved very useful in the low-lying area of south-east England, but they also suited New Zealand very well and with the Southdowns they formed the foundation of the present breeds there. The Suffolks are probably the most beautiful, while the northern breeds, the Border Leicesters, the Cheviots, the Herdwicks, the Black-faced, etc., are among the most hardy. Of the smaller breeds the Southdowns are the best known: they are hardy and produce meat of excellent quality.

Modern sheep husbandry is dominated by the fact that the British public now prefers lamb to mutton and wants small joints not too fat. In consequence farmers require breeds yielding large numbers of lambs capable of rapid growth. They are born in the spring and fattened off during summer

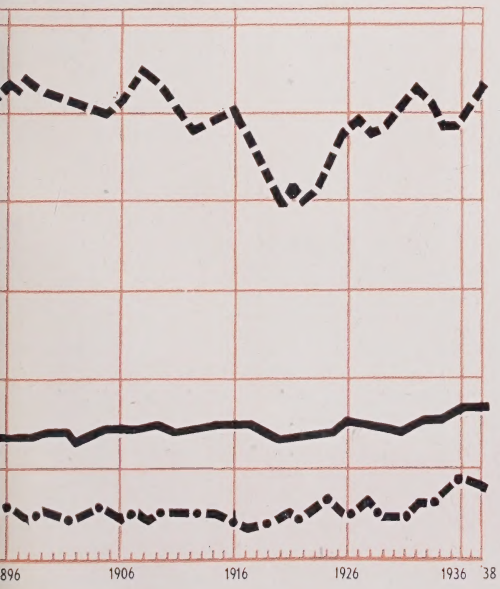
NUMBERS OF PIGS, SHEEP AND CATTLE IN GREAT BRITAIN 1866-1938



and autumn, hence they never see a winter and in consequence winter hardiness is not essential. The breeds vary in prolificacy, From some, e.g. the Romney Marsh, 100 ewes may produce 80 saleable lambs per season, but others do better. The Border Leicester-Cheviot, a fusion of two very similar breeds, may produce 160 or more and has become the most popular in England and Wales. The ewes not only deliver twins with great regularity (sometimes triplets or quadruplets which, however, the shepherds do not like) but yield sufficient milk to bring them up well, and they behave generally as good mothers. The ewes are crossed with Southdown, Suffolk, Oxford or others according to the requirements of the market.

The lambs are born in February or March in the grass fields : they grow up with the grass, and fatten on it : most of them are sold and eaten before it dies down. The ewes are put to the rams in autumn and during the winter are fed on arable crops, swedes, kale, etc., and of course as they are pregnant they need corn and cake in addition.

The change from the old system to the new was not very easy. As the sheep went their place was taken by dairy cattle, one

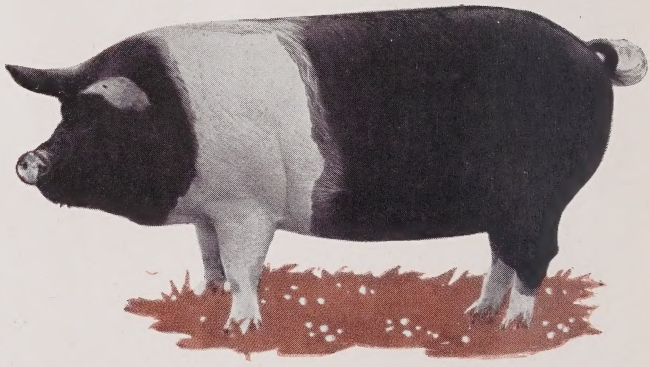


ROMNEY MARSH RAM

WELSH MOUNTAIN RAM

SOUTHDOWN RAM

TAMWORTH SOW



ESSEX SOW

GLOUCESTER OLD SPOT SOW

cow replacing six to eight sheep, so that the increase in dairy cattle was accompanied by a decrease in number of sheep. But from about 1920 the new system became better established and both sheep and cattle were increasing right up to the time of the war.

## Pigs

Pigs are extremely useful animals on the farm but they require careful and intelligent management. A good farmer can always be judged by his pigs : if they are well kept, clean, in good condition, bright-eyed and

friendly, one can be sure that the standard of farming is good ; but if they are dirty and poor looking it is likely that other things are wrong too.

Pigs do well in the open during spring, summer and autumn, and they can be run into woodland or rough pasture where the rings can be taken off their noses and they can dig to their heart's content ; they must, however, be given some shelter. In winter they have to be brought into the buildings but they should be kept clean; pigs are neither more dirty nor more greedy than other farm animals though man's mismanagement can make them so.

There are several important breeds, and black breeds still survive, but the white breeds have become more popular, especially the large White or Yorkshire White, evolved by Yorkshire weavers in the old days when they still retained their interest in food production. The Large White has extended into Europe and is used in Poland and in Russia. There is also a red pig, the Tamworth : black and white breeds, the Berkshire and the Wessex Saddleback ; a spotted pig, the Gloucester Old Spots, and others. Each variety has something to commend it and so all have survived.

Selection is always in the direction of more rapid growth and maturity, which means a better utilisation of the food. Pigs are the most efficient of all farm animals as transformers of food into meat : to produce 1 lb. of carcase, pigs require about 5 lb. of dry food as compared with about 16 lb. needed by sheep and 22 lb. by beef cattle. But such good results are obtained only when the animals are properly fed and looked after, well housed in clean, warm, well-ventilated sties.

Pigs are used for pork or for bacon but the two purposes are not quite interchangeable. The bacon curers require animals about 180 to 260 lb. live weight, giving dressed carcases of 135 to 190 lb. : the higher weights are preferred in the north country, the lower in the south : the animals should be about seven or eight months old. For pork the weights should be less : about 120 to 130 lb. live weight, about 100 lb. carcase weight, and the animals should be ready at the age of five or five and a half months. Large Whites and Tamworths make good bacon : Middle Whites and Berkshires make good pork, while Blacks and Saddlebacks can make either, but it is usual to keep the pure breeds for breeding purposes and to use cross-breeds for meat production, choosing a cross that suits the market.

The production of all kinds of live stock has been greatly helped by the Breed Societies which have looked after the pure breeds, and the Recording Societies, the officers of which visit farms regularly to record the performance of the animals : yields of milk of cows, number of pigs in each litter and their rates of growth. Farmers thus learn which of their animals are less effective than the rest and can eliminate them, replacing them by better ones, thus raising the level of the herd.

LARGE WHITE BOAR

# III

## THE WAR PERIOD 1939 ONWARDS

The war of 1914 to 1918 had shown us that during war time our agriculture should aim at supplying a substantial basis of food supply so that the country could not be starved out however much war operations might interfere with our imports.

Before the war the average consumption of food per head per annum was stated to be : flour 212 lb. (this required about 300 lb. wheat), potatoes 220 lb., meat 140 lb., fish 46 lb., vegetables and fruit 200 lb., sugar 100 lb., butter 25 lb., cheese 10 lb., margarine 16lb., fresh milk 25 gallons, and 230 eggs. The population of Great Britain is very large (45 millions) and the area of the British Isles is very small, so that it was impossible to produce all this food at home and no less than 60 per cent of it by value was imported.

### The Problem

It was manifestly impossible to continue this dietary in war time. Fortunately in the intervening peace period the science of human nutrition had greatly advanced and nutrition experts were able : (1) to work out the number of calories, the weight of protein and the units or vitamins and mineral substances that must be available for the whole community in order to ensure full health and full working vigour ; (2) from their knowledge of the average composition of the various foodstuffs produced in the country or imported from overseas, to draw up various dietaries satisfactory from the physiological point of view and to select those most easily

Table VI — FOOD SUPPLIES PER HEAD OF POPULATION, GREAT BRITAIN OCTOBER 1941.

| *Food* | *Quantity per week, Oz.* | *Calories* | *Protein Grams* |
|---|---|---|---|
| UNRESTRICTED | | | |
| Flour ... ... ... ... | 40 upwards | 4,400 upwards | 125 upwards |
| Oatmeal ... ... ... | 12 upwards | 1,500 upwards | 45 upwards |
| Potatoes ... ... ... | 80 upwards | 2,160 upwards | 48 upwards |
| RATIONED | | | |
| Bacon ... ... ... ... | 4 | 600 | 16 |
| Beef and Mutton ... ... | 12 | 600 | 70 |
| Butter and Fats ... ... | 8 | 1,800 | — |
| Suet ... ... ... ... | 2 | 520 | — |
| Sugar ... ... ... ... | 8 | 900 | — |
| Milk (3½ pints) ... ... | 70 | 1,300 | 65 |
| Cheese ... ... ... ... | 1 | 120 | 7 |
| Eggs (2) ... ... ... | 4 | 200 | 14 |
| OTHER FOODS : Fish, Vegetables, Fruits, Jams, Dried Pulses, other grains, etc., to raise the calories and protein to or beyond the required amount. | | | |
| REQUIRED : | | | |
| Sedentary Worker ... ... | | 15,750-17,500 | 490-700 |
| Manual ... ... ... | | 24,500 | (250 of first-class) |

## Table VIa

DECEMBER 1942

| *Food* | *Quantity per week Oz.* | *Calories* | *Protein Grams* |
|---|---|---|---|
| UNRESTRICTED | | | |
| Flour ... ... ... ... | 40 upwards | 4,400 upwards | 125 |
| Oatmeal ... ... ... ... | 12 upwards | 1,500 upwards | 45 |
| Potatoes ... ... ... | 80 upwards | 2,160 upwards | 48 |
| Vegetables ... ... ... | No limit | | |
| RATIONED | | | |
| Bacon ... ... ... ... | 4 | 600 | 16 |
| Beef and Mutton ... ... | 16 | 800 | 93 |
| Butter and Fats ... ... ... | 8 | 1,800 | — |
| Suet ... ... ... ... | 2 | 520 | — |
| Sugar ... ... ... ... | 8 | 900 | — |
| Milk (2 pints) ... ... ... | 46 | 860 | 44 |
| Cheese ... ... ... ... | 8 | 960 | 56 |
| Eggs (2 dried or in shell) ... | 4 | 200 | 14 |

OTHER FOODS not rationed (or rationed on points) but in restricted supply ; some quantities however are always available. Dried milk, fish, poultry, jam and marmalade, fresh and dried fruit.

produced at home, and to advise about variations from time to time in accordance with different conditions of supply.

A dietary was worked out which is physiologically adequate to keep the nation in full health and vigour, but different

*In war time speed is essential. Ploughing by night is carried out on many farms.*

from the old one in that some 70 per cent, and perhaps even more, can be produced at home.

The new dietary provides :—

(1) unrestricted quantities of bread, potatoes and vegetables

(2) adequate milk for all children, pregnant women and sick persons on a priority basis that gives them more than shown in Table VI ;

(3) adequate cheese for all (more than in peace time) ;

(4) sufficient meat and fish and sufficient fat and fruit to complete the diet.

A fairly simple system of rationing ensures equitable distribution of essential foods, and allows the necessary variations to be made.

Tables VI and VIa show how a dietary can be built up in this way ; they give the weekly supplies available at two different stages of the war.

## The Plan

The old dietary had required about 1·6 acres per person at British yields, but the new one requires only about one acre. In consequence Britain is able from its limited area of land to feed far more people than before.

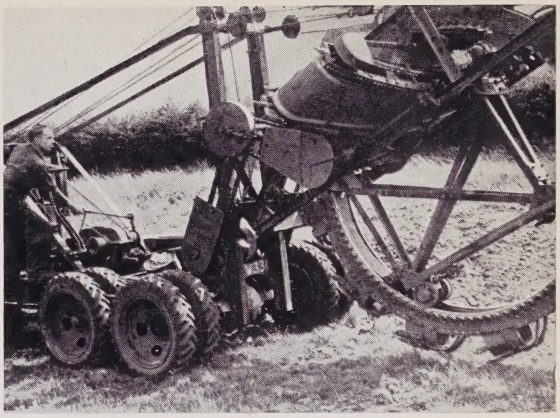
One important difference between the new and the old dietaries is that the new one contains much less meat, and so has less need of grassland than the old. But it requires more potatoes and more vegetables, also the shipping situation requires that more corn should be grown at home. In consequence farmers have ploughed up much of the grass and turned it into arable land. In addition much waste or semi-waste of land has been improved and is now producing considerable quantities of food. The usual official statistics are not published during the war, and very few figures have been divulged, but a few months ago the Minister of Agriculture announced that as compared with pre-war days our acreage of wheat had risen by over 30 per cent, of oats by over 50 per cent, and of potatoes by 70 per cent, while vegetable production had increased by 50 per cent ; all this in spite of the drafting of agricultural workers to the Forces. In 1943 the increases were greater. Some five to six million acres have been added to the area of ploughed land.

1 *Pigs turned loose on waste ground rout it up and begin the process of cultivation.*

2 *Tractors and gyro-tillers clear the ground of bushes and undergrowth.*

3 *A view of the business end of a gyro-tiller.*

4 *A bulldozer levels the ground when it has been cleared.*



6 *A huge mechanical excavator digs drainage ditches one foot wide.*

5 *A giant 80 h.p. tractor operates a " Mole " drain-laying machine.*

7 *The ditches are trimmed and finished by hand.*

8 *Then the disking machine gets to work and breaks up the ground.*

9 *A five-furrow plough at work on reclaimed grassland.*

*Women on the land. Ten tractors and binders, driven and operated by girls, cutting a huge field of wheat in Sussex.*

This conversion of grassland into arable land necessitated the application of large quantities of lime and fertilisers. We have abundant supplies of lime in the form of chalk and limestone, and these are distributed cheaply to farmers by aid of a subsidy.

Fortunately there is no shortage of nitrogenous fertilisers. Phosphates were in short supply so long as the North African supplies were cut off ; but with the help of the United States steps were taken to meet this deficiency and also the lack of potash. These were very effective and the yields in 1942 were in many places above the average. Now, with North African sources cut off by the Allies, it is Germany's turn to lose phosphates—but she has no U.S. to supply the shortage.

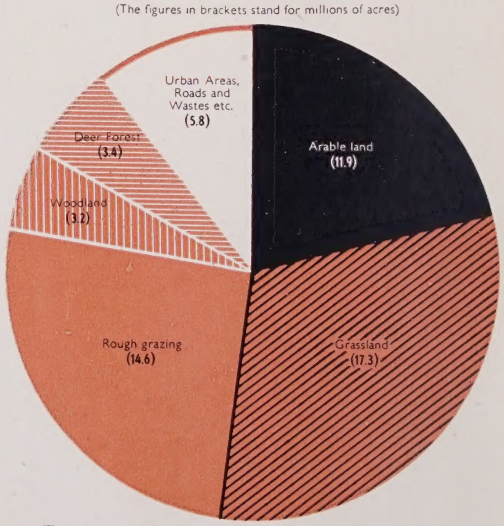
## Land Reclamation

Other improvements were needed. Many thousand acres were liable to be very wet and could not be cultivated until they were

UTILISATION OF LAND IN GREAT BRITAIN

Total area 56·2 million acres

(The figures in brackets stand for millions of acres)




(The pre-war utilisation of the land is shown here. But during the war the area of arable land has gone up while that of grass land and rough grazing has gone down.)

*Fig. 10*

*Stooking up a fine crop of oats grown on ground which before the war was waste land.*

drained ; some 30,000 acres of waste, chiefly in the low-lying parts of the eastern counties, were reclaimed by large drainage schemes ; some 200,000 acres of farm land were improved by mole or other types of drainage, and some 2,000,000 acres were improved by organised treatment of the ditches. Much work had to be done in removing tree roots and stumps; for this either explosives, caterpillar tractors, or powerful bulldozers—some of them 75 horse-power—were used.

Great work was done, too, in organising the efforts of the farmers so as to ensure that the foods needed should be produced. The Ministry of Food and Ministry of Agriculture decide what foods must be produced at home. In each county a War Agricultural Committee has been set up to organise the farming operations over the regions and tell farmers what crops they are expected to produce. Farmers and farm workers are working vigorously ; many of the men have joined the Forces but their places have been taken by women. Full use is made of machinery, and women quickly learned to drive the tractors—they are doing it very well ; per 2,500 acres of cultivated land Britain now has more than 15 tractors and the number increases.

Besides these farming efforts great efforts are made by people living in towns to grow food in their spare time. Wherever possible, unused land in the towns is converted into small gardens in which potatoes and other vegetables are grown, usually under instructions from the Parks Superintendent, helped by model gardens in the parks, lectures and demonstrations by local experts, talks by the B.B.C. and other ways.

There are several advantages in this local garden production. A great deal of transport is saved ; this in war time is an extremely important consideration. The producers have the advantage of fresh vegetables instead of older ones that have lost some of their vitamin content. The addition to the national food supply has been considerable, and people have been able to assure for themselves supplies of vegetables that they specially like, and that will help them more fully to enjoy the new dietary.

Finally, great efforts are being made to improve the cooking. The new dietary requires rather different treatment in the kitchen from the old one, and accordingly various educational efforts are made by the B.B.C. and the ordinary educational organisations, and in other ways to introduce new methods and new recipes and to popularise their use.

*It's hard work—but it's healthy. Thousands of women in Britain have turned their hands to the land as their contribution to the war effort.*

# British Crops

WHEAT

OATS

RYE

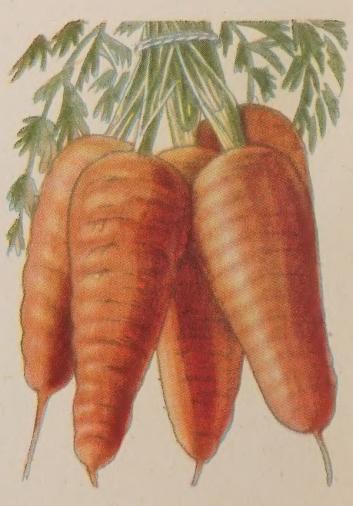
BARLEY

POTATOES

SUGAR BEET

HOPS

BROAD BEANS



CARROTS

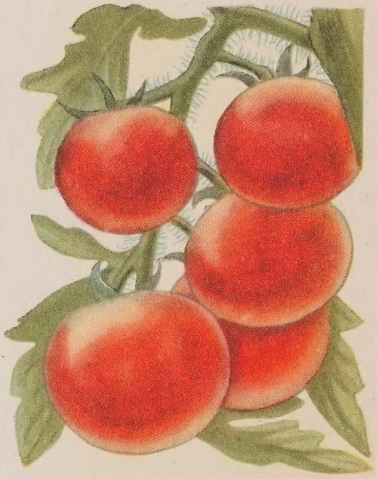
CABBAGES

BRUSSELS SPROUTS

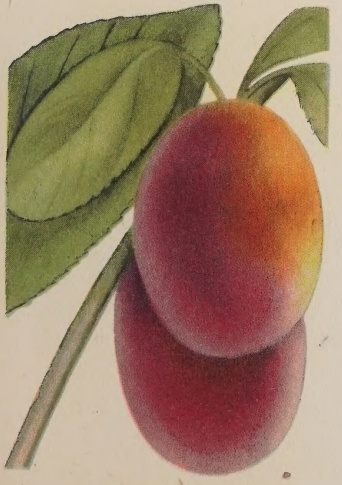
CAULIFLOWERS

PEAS

RASPBERRIES



TOMATOES



PLUMS

PEARS

APPLES

# SIR JOHN RUSSELL

Sir E. John Russell is regarded by many experts as the world's foremost agricultural scientist. He is particularly noted for his researches in soil science, and many nations have benefited by the results of his experiments, and by his writings.

Born in 1872, Sir John became in 1912 Director of Rothamsted Experimental Station—the oldest Agricultural research institution in the world, which recently celebrated its centenary. Already, he held scientific degrees at several universities, and was a member of agricultural societies all over the world. He remained at Rothamsted until September 1943.

During the war of 1914-18, Sir John acted as technical adviser to the food production department. To-day, as Chairman of the Agricultural Committee of the Inter-Allied Post-War Requirements Bureau, he is preparing for the task of bringing back under cultivation the devastated fields of Europe.

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Farming in Britain.

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